Analysis of the main causes of the fire emergencies in five NYC boroughs in year 2020.

Data overview:

Data obtain for this analysis comes from NYC Open Data portal, and it is available on their website.

The analysis was performed using Python's Pandas module in Jupyter Notebook, full details are available on my GitHub page.

The data set lists the closed and completed cases that were investigated by FBI in NYC between 2016 and 2021. Data lists exact time and date of the fire, borough, fire battalion, community district, police precinct, incident classification (e.g., residential, vehicle, hospital, sidewalk), cause fire description (for e.g., electrical wiring, portable heater, propane stove), and fire code category (e.g., incendiary, open flame, heaters, smoking).

For this analysis, I have chosen to investigate the cause of fires in year 2020, therefore I extracted all the data for this year from the main data set for further cleaning and analysis.

The 2020 data set did contain some null values; null values in the fire battalion column were left unresolved, which did not affect the usefulness of the dataset. There were two cases of missing values in the incident classification column and one in the fire code category; these issues were resolved by replacing null values with the most common variable for each category.

Data analysis findings:

In the year 2020, there were a total of 4,272 fire cases in the NYC five boroughs.

1. Main sources of the fire emergencies in NYC in 2020 by the borough:

- The most fires occurred at MD residential locations with the total of 1786 cases, with Brooklyn topping the category with 590 cases and the Staten Island having the least number of 40.
- The second most fires occurred at PD residential locations with total of 658 cases, with Queens experiencing 280, Brooklyn 210 and only one in Manhattan.
- Next, we have vehicle fires that occurred 653 times, mostly in Brooklyn (192) and Bronx (187).
- In the fourth place we have commercial structure with 332 total cases. Manhattan (90), Brooklyn (80) and Queens (88) being very close with the number of fires, while Staten Island had only 24 cases.
- Garages/sheds burned the mostly in Queens, while rubbish mostly in Brooklyn.
- Manhattan had the most transit fires (19), and hospital fires (5) compering to the other boroughs.

2. Main causes of residential fires in 2020: (both MD and PD Residential)

- There were 652 incidents of incendiary fires with majority of them being in the Bronx (205).
- There were 615 electrical fires with majority of them being in Brooklyn (218) and the least being in Manhattan (92).
- Smoking incidents caused a total of 262 fires, while open flame incidents resulted in 176 cases.
- Fires caused by using heaters occurred mostly in Bronx, Brooklyn, and Queens, while Manhattan and Staten Island had disproportionately less heater fires.

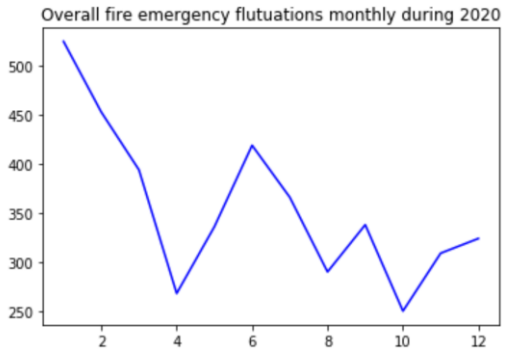
3. What was the subject of incendiary fires in 2020 by borough.

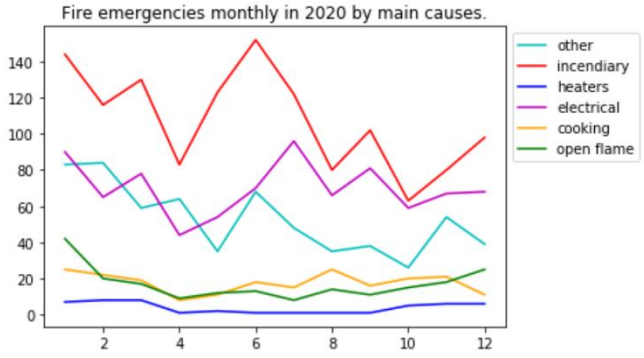
- Incendiary fires accounted for total 1,293 cases, with majority of them being in residential structures (652).
- Next, we have 281 vehicles fires followed by 130 cases of garbage fires.
- Also, there were 64 incendiary fires in commercial structures and 26 in public transit locations.

4. Fluctuation of fire emergencies depending on the time of the year.

There is a general trend for fire emergencies to increase during winter months, mostly due to electrical fires and open flames. Also, there is a spike in fires in the middle of summer months mostly due to incendiary fires and open flames. Fifty percent of open flame cases pertain to burning candles, while sixteen percent are caused by legal use of torches. Further investigation would be needed as to explain why their significant spikes in those fires in specific months of the year are such as February, June, and November.

Reviewing the fire emergencies by month, we noticed a spike to over 140 incidents of incendiary fires in June of 2020. This is a very significant number in comparison with the other month like April or October. There could be a connection to newly established Covid19 restrictions that took place around April - May of 2020, but to confirm this hypothesis more data would need to be analyzed, such as the rate and timely distribution of incendiary fires from previous years.





Conclusion:

The analysis of this data reveals that there is a significant pattern when it comes to fires throughout the months of the year as well as per borough. Data review indicates that incendiary fires were the leading cause of fires in 2020 followed by electrical. Further analysis could be performed on other years to see if similar patterns existed previously since 2020 was very specific due to the pandemic. The data set could be further explored by focusing in more detail on community districts to isolate specific neighborhoods and to search for existing patterns using fire descriptions.

City officials and nonprofit social organizations could benefit from this type of data by focusing on what type of fires occur within certain boroughs, and then creating outreach and educational programs to help with preventing future incidents in those communities. The data could also be used by the NYPD or FDNY to determine where, and during what time incendiary fires occur and take preventative measure in the future.